The AMERICAN ENGINEER

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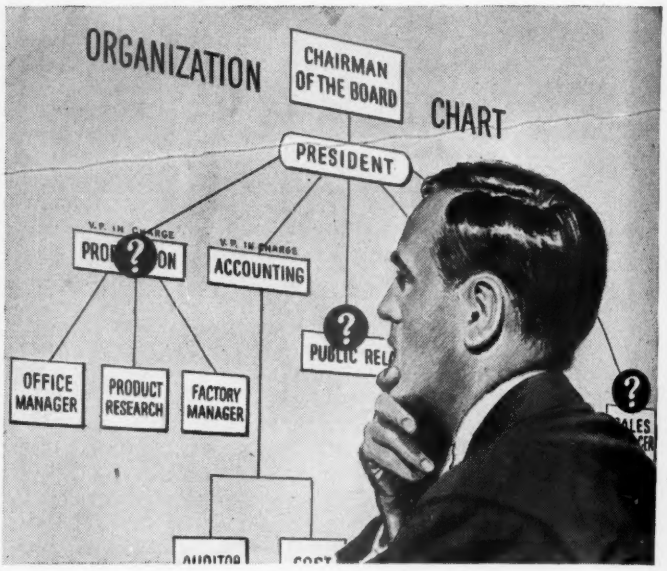

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Five Responsibilities Of Engineers in Industry

A discussion of the five basic responsibilities of the engineer in industry, together with pertinent comments on his professional responsibilities and privileges, his compensation, and some extremely valuable tips from a successful and experienced engineer.

By W. H. Gille

Right at the present time over 50% of all engineers are employed in industry and at some time in their professional lives, the majority of them may be employed in industry at least in a training capacity if not for a lifetime career. Dr. Price* emphasized the fact that one of the first decisions to make upon entering the engineering field is whether to be an artisan or a professional. This decision is more important in the industrial field than in any other because of the influences of industry on engineering. My purpose today is to outline the function of industry so as to help the young engineer decide whether he will be a "technician" or a professional.

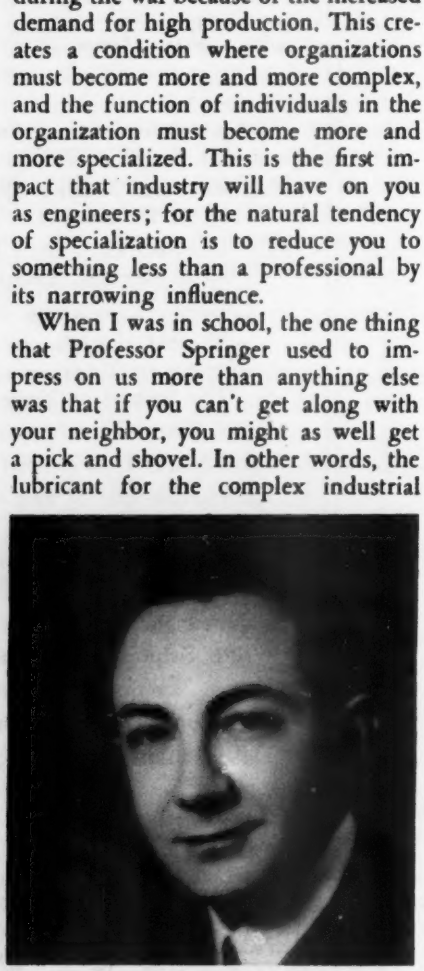
Civilization's Hub

Engineering and science form the hub around which our modern technological civilization revolves. Industry, agriculture, commerce and finance are major spokes of this gigantic wheel whose purpose it is to carry the burdens of humanity as smoothly as possible. Failure of any member of the wheel to carry the stresses imposed on it by the others results in breakdowns that delay social progress. Engineers are "key men" in all the spokes of the wheel, but particularly in industry. Consider any function you wish—farming, dish washing, transportation—engineering either provides a fundamental foundation on which the function operates or provides instruments which greatly improve the efficiency and smoothness of the operation, thereby forming the groundwork for our modern living conditions.

The Engineers Function in Industry

Modern industry constitutes one of the most highly organized and efficient machines in our social structure. The art of manufacture is becoming more and more complicated as times goes on, whereas the learning capacity of individuals is advancing at a very much lower rate despite the tremendous increase in the reservoir of scientific knowledge. This was particularly true during the war because of the increased demand for high production. This creates a condition where organizations must become more and more complex, and the function of individuals in the organization must become more and more specialized. This is the first impact that industry will have on you as engineers; for the natural tendency of specialization is to reduce you to something less than a professional by its narrowing influence.

When I was in school, the one thing that Professor Springer used to impress on us more than anything else was that if you can't get along with your neighbor, you might as well get a pick and shovel. In other words, the lubricant for the complex industrial machine is cooperation, or teamwork. You will function satisfactorily, not as a rugged individual, but as a part of a team; and your team must cooperate with other teams. The engineers in industry constitute about 3% of all industrial personnel, therefore, the majority of the people with which you will work intimately are not professionally minded, either by training or inclination. Herein lies the second impact of industry on engineers. For there is a strong tendency to class you, along with the great majority, as "just another employee." The tendancy of a considerable number of engineers to join heterogeneous labor unions tends to justify this attitude. This, to me, is one of the most serious factors that the engineer in industry has to face—and one which only a united body of engineers can resist.



W. H. Gille

Mr. Gille in addition to being a registered professional engineer of recognized standing is Chief Engineer of the Minneapolis-Honeywell Regulator Company. This article is based on his address before the senior class of the Institute of Technology, University of Minnesota.

Economical Production

The purpose of industry is economical production for consumption. Engineers are sometimes inclined to overlook the importance of the fact that "economy" is a basic factor. It must be remembered that we are living under a competitive system and that every unit of industry must be able to stand on its own feet. The product must be sold at a price which makes it attractive to the consumer over other devices of a similar nature. At the same time the price must permit a sufficient reward to investors to finance the expenses of industry, and must include wages that will attract and hold labor. The success or failure of many companies rests on their engineering departments. They must depend on their engineers to keep the design of their products and the cost of manufacturing up to date and in competition with other organizations of a similar nature.

Five Basic Functions

Engineers provide five basic functions that are vital to the carrying out of this purpose of industry:

(1) Research in basic phenomena and development for applications.
(2) Design and development of devices and materials for mass production.
(3) Supervision and planning of methods of production, tools, processes, and time standards.
(4) Application of engineering knowledge and equipment to meet specific customer requirements.
(5) Administration of engineering, production, and personnel work.

(*Continued on page* 14)

*See *The American Engineer, April,* 1947.

Engineers and Finance-Practical Tips

Professional men—and particularly engineers—are apt to become so absorbed in their immediate day to day tasks that they forget they are earners of money or parts of money making machines, and that if they cease to be such their immediate and important work is apt to go for naught. In his comments on "Engineering's Financial Side," Mr. Bennett offers sound advice and several helpful hints to both the young graduate and the experienced engineer.

By R. H. Bennett

Modern finance, both governmental and private, is infinitely complex. To get an idea of its complexity we need only look at the organizational form of modern institutions:

(1) A private financial institution, for instance, will have departments dealing with real estate and mortgage loans, with loans and discounts, with accounting, with exchange, with appraisals, and many other departments.

Budget Division

(2) A governmental bureau or department will have its budget division, its comptroller and accounting division, and in some instances its planning division.

(3) An industrial corporation will generally have a vice-president in charge of finance, and under him will be the comptrollers, auditors, bookkeepers, cost accountants, and tax counsel.

In the course of his professional life an engineer may well come into contact with all, or at least most of these branches. To guide him in threading this financial maze he will have to rely more on experience than education. Fortunately most engineers take naturally to problems of finance since their training in analysis and mathematics predisposes them towards it.

Classifying Projects

Financing engineering projects may be divided into two classes: (1) construction and (2) repairs and maintenance. This division is natural, but the line between the categories is not hard and fast. A new structure may for accounting purposes be classed as maintenance when it replaces and improves an older one. For instance in highway work a bridge may be constructed to replace a culvert which has caved in. The new bridge could well be charged to maintenance.

Usually, the engineer will be called upon to design and construct the bridge, but from time to time he will also be called upon to provide a basis for or justify decisions of accountants.

From an accounting viewpoint new construction is a capital item on the balance sheet, and maintenance or repairs an expense item. In public works the distinction is generally made in accordance with the theory of accounting. In private industry the controlling factor frequently is what the Bureau of Internal Revenue will permit by way of charges to expense. In these years of high income taxes it is, of course, an advantage to a corporation to charge current expense with any items which the regulations will permit.

In accounting theory a piece of construction is a capital item if it performs a new function, results in added earning power, or permits new services. The last item is important in state and local government accounting practice. A maintenance job is one that continues the functions of an existing structure or service.

R. H. Bennett

R. H. Bennett is generally admitted to be one of the most prominent mining engineer in Minnesota. He is also an accomplished author, having recently published "The Compleat Rancher." This article is based on his address to the senior engineering students, University of Minnesota, March 4, 1947.

The distinction between capital and maintenance items is usually drawn by the comptroller or auditor and not by the engineer, although he may be called upon for advice in the matter. I shall devote most of my time today to industrial finance rather than government because this is the field with which I am directly familiar; however, I have served on a large governmental engineering job, and believe that I can make some observations of practical value in the field of governmental finance.

Governmental Work

In governmental work there is no discernible limit to the wants of the electorate but there is always a limit to the amount of revenue that can be collected. This results in a form of competition between the various departments of government for the taxpayer's dollars.

The engineer in government will often be called upon to assist in the design and estimate of new projects. Theoretically he is not directly concerned in his professional capacity with the appropriation from which these structures are to be built. Chiefly, his job is to design and build them if and when the money becomes available. In practice, however, the governmental engineer may be called upon to act as a protagonist or promoter of plans. This he can do ethically if he is convinced of the desirability of the project and knows that the planning thereof is adequate and economical. He may, however, find himself subjected to devious and dishonest pressure and this his professional integrity should compel him to resist.

As a citizen the engineer in public or private employ has every right to express himself on the subject of new programs and new construction. His counsel is valuable and he should give it as a public service. Unfortunately it is all too frequently ignored.

Most often the engineer will find himself in no way directly concerned with the means by which government construction money is furnished. The duty of the engineer is to see to it that available funds are spent to best advantage.

The Cost Estimate

At some point in the development of any project a cost estimate is made. This may be between preliminary design and final design or it may not be made until full plans and specifi-

(*Continued on page* 4)

(*Continued from preceding page*)

cations have been completed. The engineer's estimate is an important part of his professional duty and falls within the scope of my subject. I shall have more to say about it later, in the discussion of industrial finance. The same ethics apply to the estimate of the professional engineer in government service as to his professional colleague in private industry.

It is a temptation to pause here and discuss the field of public finance and taxation. I shall not, however, have the time for this, except to say that the engineer has a greater interest than any other professional or trade group in the preservation of a dynamic or growing economy. *The number of engineering jobs is in direct ratio to the rate of growth of his city, state, or nation. The amount of tax revenue, upon which the governmental engineer depends, must, under our system of government, bear a direct relation to the industrial and farm income.*

Keep Dynamic Economy

One basic problem seems to be to find out what is the optimum percentage of national income that can be diverted through taxation to those multitudinous public services that the electorate desires and still keep a dynamic or growing economy. The question is, in essence, when does the law of diminishing returns begin to apply in the field of public finance with particular cognizance of taxation. The experience in the last year and a half since the end of the war seems to fix that point far above that which most economists thought possible. There is remarkable vitality in our private enterprise system or, as it is more adequately described, our profit-and-loss system.

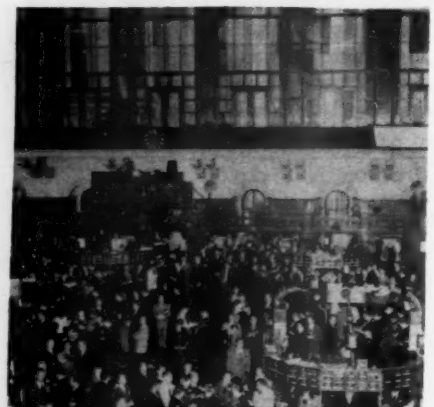
Another interesting speculation is whether there can emerge under present rates and forms of taxation those great industrial geniuses who have given us, in large measure, our present material civilization—such men as Cyrus Field, George Westinghouse, Alexander Graham Bell, Thomas A. Edison, James Douglas and George Eastman.

Personal Observation

If I may add a personal observation, my twenty-five years of active engineering work have taught me, reversing a bias of my undergraduate days, that the industrial history of this country is but the lengthened shadow of great engineers and industrialists of this type. It takes great sagacity, intelligence, knowledge, and above all moral and physical stamina, to found a new industry or to administer an old one.

To return to the subject of engineering estimates: Strictly speaking, an engineering estimate comprises the total cost of the labor and material necessary to construct a given piece of work, or perform a given service. Broadly speaking, however, an engineering estimate concerns itself with the total costs over the life of the structure, and justifies or condemns the project by what may be expected not only as to initial costs but by performance over the life thereof.

To illustrate let us suppose that in the same county there is a mine and a flour mill, each demanding an identical amount of power. The estimates of the construction costs of the two power plants may be identical, but if the mine



New York Stock Exchange
Private Finance

has an orebody that will be mined out in five years and the flour mill a life of as long as farmers grow wheat and railroads exist to bring the wheat to the mill, the true costs of power, which is the real purpose of the estimate, will be far different. This factor of life enters into any complete estimate, because from it the amortization and depreciation rates are determined. This annual charge, plus maintenance and repairs, must be added to the interest on the money spent. Against the total so determined the economies to be accomplished are offset. In industrial practice these economies are expressed in dollars and cents; in government work sometimes in dollars and cents, sometimes in improved service to the public, and sometimes in a combination of the two.

Admittedly the factor of improved service to the public is a difficult one to appraise. However, if it is ignored, the engineer making the estimate may find himself in trouble.

Life Span Ignored

Let me give an example where the element of life was either ignored or inadequately estimated. Before the Minnesota State Highway Commission was established. the counties provided trunk highways, and these were for the most part constructed with a gravel surface on an inadequate sub-grade. Bonds of from fifteen to thirty years term were sold by the counties to provide the money. A gravel surface was thought to be adequate. I remember seeing the statement that the soft rubber tires of the auto would be much easier on roads than the steel tires of the farmer's wagon. But it worked out that the opposite was the case, and the increased loads and speeds of the motor vehicles tore the new gravel roads to pieces. The estimates of the county engineers may have been correct as to original cost, but the roads were worn out long before the county bonds, by which these roads were built, had matured. In many cases the costs of gravel roads to taxpayers were doubled by the fact that interest on the debt continued beyond the life of the structure.

Engineering Economics

It would not be fair now to invoke hindsight and say that the county engineers made poor estimates since they could not have foreseen the trend of automotive development. Nevertheless the incident illustrates a principle of engineering economics.

There are those who would say that the financial side of a construction program is not the concern of the engineer making the estimate, that this falls in the province of management or of the executive authority. I believe, however, that such engineers take too parochial a view of their profession. Certainly an engineer is of more value to his employer, and has a more satisfying professional life, if he projects his plans financially as well as on the drawing board.

In industrial practice, a construction program is surveyed as to useful life by the engineering or executive departments, or by both before work is begun. The element of amortization and depreciation is, in theory, fixed regardless of the way in which the funds are to be furnished. In general, management must be satisfied that the

cumulative purposes and economies to be accomplished over the life of the structure less maintenance and repairs must be greater than the cost of the structure plus interest and depreciation over its term of life.

This general rule is sometimes modified, however, in unsettled conditions such as we now have, if the new construction: (a) lightens the labor of the workmen, or (b) simplifies the manufacturing process. Under such circumstances the decision to proceed may be made even though the formula referred to does not show absolute savings in dollars and cents. Such modifications are made because it is increasingly difficult to get workmen to perform disagreeable work, and it is hard to get executives who will stand up under the load of a complex process to which is added government regulations and labor problems.

It is difficult to make reliable engineering estimates with present uncertainties as to material costs and labor rates. If an engineer is directed to make a concrete estimate, he should properly qualify it as to these uncertainties.

Costs and Labor Rates

I might add that material costs and labor rates are operating to cancel many construction programs which companies had either completely or partially prepared during the war years. Under existing circumstances management is wary of risking stockholders' money in construction programs that may cost much more than estimates, particularly when competitors programs exceed estimates by 150 or 200 per cent. Work which must proceed is now being done by a plant's own force or by the most responsible contractor it can persuade to take the job on a cost plus contract.

It is to be hoped that the shifting price level will soon stabilize, so that reliable estimates can once more be made. A reasonable expectation that a specific piece of work can be done for a definite figure is a prerequisite to a healthy industrial or governmental economy. The advantage that an engineer appears to gain through not being held to a definite figure is illusory, for under such circumstances not much new work will be undertaken.

Before leaving the subject of engineering estimates, I might say that in my experience many engineers, particularly young engineers, err in making preliminary estimates upon a theoretical instead of an empiric basis. For the purpose of making a preliminary estimate, which is generally the one upon which the decision of whether or not to proceed is taken, the engineer can usually take one of two courses. He can either take off a bill of materials, get unit prices, estimate the cost of fabrication and assembly, secure unit labor rates, and estimate labor performance, and put these all together, or he can find out what similar structures, recently built, have actually cost, and then adjust this cost for local conditions. The second method is usually much quicker and probably more reliable. It is, of course, not available when the structure or product is new in design.

It presupposes that the engineer keeps abreast of his technical publications and also that he makes and keeps up friendships with his fellow workers. A five minute telephone call to a professional friend in a neighboring town may save five days of calculations.

U. S. Treasury . . . Public Finance

Financial Statements

Despite the practical problems which he will encounter, an engineer should remember that he can best maintain contact with the fundamentals of modern finance through corporate financial statements. This is basically important to both the young graduate engineer and the experienced professional. An understanding of corporate finance enables the engineer to grasp what are his employer's problems, what is the overall position of his company, how his company compares with other companies in its field, and how other lines of business are progressing.

The study of corporate finance is usually begun at the other end—that is the student in a business course starts on bookkeeping, on property schedules, on classes of corporate securities, on business law, etc. However, I believe the engineering student can best approach it from the top end—the overall viewpoint—which is what a financial statement gives him. One might compare this with the approach to the study of an industrial process. The non-technical visitor to an industrial plant does not wish to see detail drawings of structural portions nor a detailed flow sheet; he will ask for an overall view—by means of a plant lay-out sheet or a schematic flow-sheet, whereas the engineer who is familiar with processes will probably start with detail sheets

Balance Sheet

The balance sheet of a corporation is the lay-out plan; the profit and loss statement is the flow-sheet (for the period under review).

In the upper left hand column of a balance sheet we have a group of items summarized as "current assets." In the upper right hand column are "current liabilities." The excess of "current assets" over "current liabilities," and it has to be an excess if the company is to be considered solvent, is known as "working capital." It is the most rapid yard-stick to use in appraisal of a company's position, and the one which usually determines the company's ability to borrow funds at the bank.

Current Assets

Under "current assets" are various items. At the head of the list is: "cash" and "government bonds." Is the cash adequate for the payroll and supplies, and the discounting of bills? Next comes the item: "marketable securities." Are these truly marketable, or only marketable with difficulty; if so they belong "below the line," i.e., below the line totalizing current assets. If these securities are those of the company's subsidiaries, they should be so labelled, and probably put "below the line." How are the securities appraised —at market, or cost? They certainly should not be carried at more than market.

Look at the "receivables." Are they too large in proportion to the other items of "current assets?" If so a negligent credit department may be indicated. Is there a "reserve for bad debts?" Is it large enough? Many a company has gone on the rocks in time of financial stress because this reserve was inadequate.

Look at the item of "inventories."

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This is usually divided into "inventory of finished products" and that for "raw materials and supplies."

Is "inventory of finished products" too large in proportion to "cash" and "receivables?" If so the company may have overestimated its market, and should curtail operations and convert inventory into cash. "Raw Materials and Supplies" should of course be adequate to the rate of production but then again not too large. When management "loads up" on raw materials or supplies it may be suspect, unless this item is hedged by corresponding sales contracts, to be gambling on a rise in commodity prices. During recent war years almost all company management took this gamble, of necessity, but now caution is indicated.

Completing our scrutiny of "current assets" we may find other items of a minor nature, such as "approved tax refunds" or "deposits on containers."

Current Liabilities

We have now reached what is known as "the line," i.e., the total of "current assets." Across the page, we find upper right the column headed "current liabilities." Now the total of "current assets" should exceed that for "current liabilities" if the company is to be considered solvent. Look for a moment at the items under this heading. There is always one for "accounts payable." Does this seem unduly large in respect to "accounts receivable?" There may be one for "accrued expenses." This may comprise insurance premiums owing, local taxes owing, and others. Then there is an item for "Federal or state income taxes, payable over the year ensuing from the date of the statement. There may be an item for "notes payable," which comprises all debt payable one year or more from date. The rest of the company's debt should appear under "deferred liabilities."

You can ask yourself all sorts of interesting and relevant questions about these items on the "current liabilities" side, akin in nature to those I have posed concerning the "current assets" column. I shall not have time to frame these questions for you, but must pass on to other section of the "balance sheet" and to the "profit and loss statement."

Reverting to the assets column, we have the various items "below the line." First come "fixed assets,' usually comprising land, buildings, machinery and equipment. The engineer is usually more at home here than in any other portion of the balance sheet. He is often called in for appraisals of these items. He should in particular examine the "depreciation reserve," usually carried as a deduction from "plant account," to see whether it is adequate. From the "profit and loss statement" he can see what depreciation was charged to this reserve during the year under review.

Items "Below the Line"

There are other items "below the line" such as "contract payments receivable" (after one year), "development expense," and "deferred expenses," "goodwill," "patents," "franchises." When the accountant puts an item "below the line," it is because that item is not quickly or readily convertible into cash.

"Below the line" on the "liabilities side" there are such items as "reserves" (not deducted from asset accounts on the other side), "debts payable after one year," and, finally, "net worth."

This last is, in essence, the difference between all the foregoing items on the "liability" side and all the footings, current or fixed, on the "assets' side Of course, the accountant doesn't do it that way, but it has to come out to this figure. "Net worth" comprises "capital stock," "common" and (if any) "preferred,' and also the various "surplus accounts" such as "capital," or "paid-in, surplus" and "earned surplus." It should be noted that legally (except in liquidation) dividends may be paid out only from "earned surplus," no matter how big the other surplus accounts may be.

Profit and Loss Statement

So much for the quick "lay-out" survey of the "balance sheet." There are literally scores of questions that you may be asked, as experience with corporate financing lengthens. The "balance sheet" presupposes an "instant freezing" of the company, at some moment in its history. It is a stroboscopic glimpse of its condition at such a moment.

But engineers know that a machine usually has two kinds of balances—static and dynamic. The "balance sheet" is of the former kind, the "profit and loss statement" of the latter. It is here that the performance of the company in running order can best be reviewed.

I do not have time to guide your questions concerning the "profit and loss statement," but they are such as will naturally develop as your experience lengthens. The important thing is not to be complacent, but to keep alert.

There are two things a financial statement itself cannot show about a company's condition, and these transcend in importance both the "balance sheet" and the "profit and loss statement." These are: (1) is the management honest? and (2) is the management skillful?

The auditor's certificate can be taken as an answer to the former. This is usually appended to the financial statement, but it is not a part of that statement, since it is not put out by management. It is the result of an independent scrutiny and check of the financial transactions of the company during the year by an outside firm of certified public accountants.

As to the second question, is the management skillful?, only experience, intelligence, and judgment of observers can supply an answer. This is where an engineer, active in the arena of commerce, often has an advantage over the financial analyst, the professional investor and the banker—and, within the bounds of ethics, nothing should prevent his capitalizing on it.

Experience Counts

The complex financial machinery of today is no more complex than numerous other subjects that engineers study, and it will yield to methods of investigation and analysis which engineers are taught. It must be remembered that finance is a field in which experience counts for much.

We must realize that it is only the control and recording part of the nation's business. Many people, and especially public officials, lose sight of this fact, and take the symbol for the substance. The vast systems of banks, brokerage houses, security exchanges, auditing firms, and regulatory commissions, function but to record and control the production of goods and services. They are like the metering devices of a turbo-generator, and its voltage regulators, and synchronizing devices, and overload relays and circuit-breakers. As any engineer knows, it is the steam behind the turbine blades that creates the energy.

Profit and Loss System

Men live by their aspirations and their ambitions; in a word, from their inner resources. This creates steam behind the industrial system. There is implanted in the human breast the desire for advancement, achievement, distinction from the crowd. It is an universal urge; we can only call it providential.

This drive for power has taken, un-

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The Engineer Graduate's Employment Prospects

What sort of conditions does the graduating engineer find when he comes to enter his chosen profession? What does he think about his prospects and the situation which he finds? Mr. Zwoyer has just encountered this experience and has related, in this article, his thoughts. While the American Engineer and NSPE do not necessarily agree with everything Mr. Zwoyer says, it is felt that the article is worth reading.

By Eugene M. Zwoyer

As a prospective civil engineer it is quite natural for me to canvass the field regarding future prospects for employment. Through the years I investigated the possibilities for employment in various fields of endeavor which I might pursue as a vocation, and also the pecuniary remuneration which I might receive for my services.

Due to unknown causes I became interested in the engineering profession, and decided to follow the field of civil engineering. But, I also realized that engineering and good pay are not synonomous. Therefore, while investigating employment possibilities I also investigated joining an organization which might protect or better my position from the financial standpoint.

Four Possibilities

Investigations of employment showed that the field narrowed down to four possibilities: (1) a Civil Service position, (2) a highway department job, (3) working for an oil company or (4) employment in private enterprise such as contracting. Just what are the prospects of employment and advancement for an inexperienced engineer in these fields.

First let us consider federal employment through the Civil Service Commission. What qualifications must a civil engineer have to enter Government service? They are as follows:

"A. Successful completion of a standard professional engineering curriculum leading to a Bachelor's Degree in a College or University of recognized standing;

B. Four years of successful and progressive experience in technical engineering. This experience must show a mastery of the fundamental physical and mathematical sciences underlying professional engineering, and a good understanding (both theoretical and practical) of the engineering sciences and techniques, and their applications to the branch of engineering for which the competitor is applying. The experience must show that the applicant possesses an understanding of this field of engineering equivalent to that which would have been acquired through successful completion of a standard engineering curriculum in a college or university of recognized standing;

Training and Experience

C. Any time-equivalent combination of A (training), and B (experience), above. Applicants must be prepared to furnish a list of all college courses completed, showing the semester hours' credit received for each course. An official Registrar's transcript of college record is not required, but may be submitted to show this information."

Eugene M. Zwoyer

Who will graduate from the University of New Mexico this spring. Mr. Zwoyer's article is based on a paper which he presented to the ASCE meeting held recently in Santa Fe, N. M.

It is my understanding that Civil Service requirements for doctors, dentists, and lawyers are considerably different from those for engineers, in that the substitution of experience, however valuable, for the professional degree is not permitted in the medical, dental or legal professions. The American Medical Association accepts as a member no nurse, orderly, hospital janitor, pharmaceutical manufacturer, nor even a holder of medical degrees unless he is registered. It is a well known fact that the AMA exerts an influence upon the Civil Service requirements of its particular profession.

Sub-Professional Men

After reading various publications and listening to engineers tell about sub-professional men practicing engineering, it seems that the government, along with many other organizations, is tending to make a trade out of the profession. So far, there has been no effective opposition to this movement. These organizations train a man to do one particular job and nothing else—more or less an assembly line routine. They teach high school graduates to design from handbook tables, and perhaps only one man in ten is doing actual engineering work.

Next, what are the job prospects with a state highway department? In New Mexico, the outlook for the young engineer, just out of college, is very good. At the present time the starting salary in New Mexico is $250 per month which is probably a better initial salary than most could find in other position. There is the drawback, however, that advancements are slow. A project engineer, who has given many years of faithful service, receives about $350 per month; a salary much lower than the wage scale for Civil Service employees having the same length of service.

Employment with Oil Company

Should the young engineer go to work for an oil company, he will probably be working with other men of similar experience, and not competing with non-professional political employees. However, the same old story of insufficient wages is in existence here as is with the Civil Service and the highway departments. The starting salary for the young engineer ranges from $225 to $250 per month, and again wage increases are very slow. Unless

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he reaches the top positions on the company's engineering staff, he will neither receive a wage befitting his profession, nor will he be on the same wage level as some of the tradesmen employed by the same company.

Probably the best salaries for engineering services are being offered by contractors. Unfortunately not all engineers can work for large contracting firms—and not all large contracting firms are willing to hire a young engineer just out of college. Rather, they are more interested in a man with vast experience, reliable judgment, and practical ideas—qualifications that have as yet not been acquired by the young engineering graduate.

No Guaranteed Salary

Now, I do not believe that the young engineer should be guaranteed an excellent salary with periodic increases that would quickly place him in the upper income brackets. Young men are willing to work hard and prove themselves in subordinate positions. However, even in such positions engineers do work of a complexity and value equal at least to that of the average tradesman and they should be paid accordingly.

What is the outlook for the young engineer? The other night I overheard two registered engineers discussing collective bargaining. One said that we should become organized and have our own collective bargaining group. The other engineer was in opposition to this, saying that we would be classed as a trade instead of a profession. He believed that our profession was well thought of, and should be kept that way. The first engineer agreed that this was true to a certain extent, but as far as he could see, the engineering profession was well thought of only by the engineer. To the general public the engineer was a locomotive pilot or a boiler tender.

Another View

Another engineer, Mr. W. F. Ryan, of the Stone & Webster Corporation, has analyzed the problem as follows:

"Probably the greatest obstacle to our professional recognition is the older engineer, the leaders of the profession, who by their mental attitude and conduct do most to challenge the idea that engineering is a profession. These are men whose own personal recognition is secure, won in days of free enterprise, but who refuse to recognize the problem of young men starting their careers under present conditions. Their group consciousness, so far as it exists at all; is confined on the one hand to the elite of the profession, or on the other hand is so broad that it includes anybody whose interest in engineering is sufficient to desire standardization of nuts and bolts: *'Anyone with a legitimate interest,'* as it has been expressed. This would undoubtedly include the garage mechanic. It would probably include the modern housewife, whose problems with household appliances give her a 'legitimate interest', in engineering."

As a civil engineer, I naturally look to civil engineering organizations for help in these matters. What is the policy of the American Society of Civil Engineers toward strong economic action? The Society has never opposed organized labor, and membership in a trade union has never barred a man from belonging to the Society. For many years the Society has gathered information on engineers' salaries and fees, and in some instances has recommended fees to be charged for professional work. However, either these recommendations have not been followed, or they are inadequate. In spite of good intentions, the work of the Society has done very little to advance the economic standing of the engineer.

Regretable Resignation

The following letter, written to the Society by a civil engineering professor when the Society transferred him from a junior to an associate member, illustrates one problem:

"I would like to thank the American Society of Civil Engineers for the confidence shown in me by approving my transfer to the grade of Associate Member. However, I regret that I must decline acceptance.

"In my opinion, the Society is an outstanding technical organization and has contributed materially to the progress of engineering science. The Society does, and rightfully should, accept credit for its part in the growth of the profession, but I believe that it must also accept a portion of the blame for the present extremely unfavorable economic position of the average member of the profession.

"In ten years I have advanced professionally from a stake puncher on a survey crew to an assistant professor in a fully accredited engineering college. However, in the same ten years as an engineer, my economic position has progressively deteriorated to the point that I now make less 'real' wages in terms of purchasing power than I did ten years ago at the absolute bottom of the ladder. I have attempted to maintain my family and I feel that the $38.00 required for dues can be better spent for rent, food, and clothing. Professional memberships have become a luxury that I cannot afford.

"Your courtesy in accepting this as my resignation will be appreciated."

This letter not only expresses the economic position of engineers and school teachers in general, but also, it is an indication of what the Society has and has not done for the engineer.

Importance of Technical Groups

The importance of engineering societies for technical and scientific progress, and the exchange of engineering knowledge, cannot be over-estimated. They have grown from real needs. They have a place in the practice of engineering which can be filled in no other way. But, we still need some means of developing our social and economic status.

At a meeting of the engineers in New Mexico a few years ago, a paper was presented by a member of the American Society of Civil Engineers which stated that the ASCE was organizing collective bargaining groups in various states. He stated that the engineers in these collective bargaining groups were divided into three distinct classes: (1) *the radicals,* that group composed of those who are definitely interested in the betterment of the economic status of the engineer, and work toward that end; (2) *the conservatives,* the group composed of those who are in favor of forming collective bargaining groups in every state, and whose main object is not necessarily to better the economic status of the engineer, but rather to keep him from being drawn into a trade union; and finally (3) *the group,* composed of those who are interested in the betterment of the economic status of the engineer, but are either unwilling or incapable of doing the necessary work involved to achieve this goal. It is easy to see that with the *conservative* group in control the primary objective of collective bargaining would be defeated.

Wage Comparison

As a matter of comparison, let us consider the wages of non-professional men and professional engineers in Albuquerque, New Mexico. Bricklayers are drawing $25 per day, approximately $500 per month. This is about twice the salary of a young en-

(*Continued on page* 17)

Legislative Committee's Monthly Report

Because of the importance of NSPE's legislative program, the American Engineer has agreed to devote space each month to a legislative report which will be designed to keep our readers advised of latest developments. The first report of this series appears below. Your comments and suggestions are invited.

By Ray Fuller

Legislative Committee Chairman

Dear Fellow Member:

Unfortunately, the chairman of a committee cannot maintain personal contact and conduct personal correspondence with each member of a society the size of NSPE.

On the other hand there is a need for some contact between committees—particularly in the case of the Legislative Committee—and the membership. As a means of solving this difficulty, your Legislative Committee will keep you advised each month, through the pages of the *American Engineer,* of its activities. The Committee hopes that you will read these monthly reports and let us have any comments or suggestions you may desire to make.

Labor Legislation

As you all undoubtedly know a great portion of the time of the Committee has been occupied recently by labor legislation and the attempt by NSPE to obtain amendments to the Wagner Act which will protect the interests of Professional Engineers. Before this report reaches your hands it may be that the decision will be known. But at this time we have reasonable cause for optimism. The Senate Labor Bill, which is being debated as this is written, contains provisions pertaining to professional employees which NSPE recommended. Every indication points to the adoption of these provisions by the Senate and we are hopeful that the Senate-House conferees on the final labor bill will look with favor upon the professional provisions. We shall not burden you with a repititious statement of these provisions or other provisions of the labor bills now pending inasmuch as they have been reported in detail in NSPE's Legislative Bulletin.

Legislative Bulletin Distribution

While speaking of the Legislative Bulletin, we should like to bring to your attention the matter of its distribution. Sometime in the near future we hope we will be able to distribute it to those members who desire copies, but at the present time, due to our limited facilities, we are distributing it only to State Society Presidents, State Secretaries, members of the Legislative Committee, Executive Committee, Board of Directors, and two copies to each Chapter of a State Society making a request. Realizing that this distribution is quite limited, we hope that the copies are being passed around among the members.

Advance Planning Program to End

By no means is the Legislative Committee concerned only with the more than 5,000 bills and resolutions introduced in Congress since it convened last January 3rd. An example of our interest in matters other than pending bills is the Advance Planning Program of the Bureau of Community Facilities, Federal Works Agency. Those who have worked in conjunction with this program know that it stems from the War Mobilization and Reconversion Act, which expires this coming June 30th. The Act authorized the making of Federal loans or advances to States and other non-Federal public agencies to assist in the preparation of plans for postwar public works. To date Congress has appropriated $65,000,000 for this purpose, most of which has been advanced to over 6500 locations.

Ray Fuller

Federal funds advanced under this authority are to be repaid to the Federal Government, without interest, when construction of the projects for which the funds were advanced is undertaken. Congress had provided an apportionment system based on population of the States. All of the States have not used the funds available to them, under the present law. The unused money cannot be advanced to other States or municipalities, but must be returned to the Treasury. A bill to overcome this limitation has been introduced by Florida's Senator Pepper.

NSPE Supports Ground Water Activity

The House of Representatives, in considering the Interior Department Appropriation for 1948, inserted provisions forbidding the use of any money for ground-water surveys. Such of our members as we were able to contact opposed this elimination of the ground-water activity because of its value to engineers and to municipalities and states. Consequently, NSPE has asked the Senate Committee considering the Interior appropriation to remove the prohibition inserted by the House and provide at least enough money to maintain the ground-water survey organization that has been developed over a period of many years.

Our letter to the Senate Committee states, "We do not feel that this prohibition is in the public interest" and if the prohibition is retained in the final bill "it will mean that the valuable ground-water surveys must come to a complete halt and that the past systematic investigations will be incomplete. There is an increasing need for reliable information on ground-water conditions by municipalities, states, industry, and private consulting engineers engaged in this vital work. We believe that a careful consideration will convince them (the Committee) that the States, counties, and local communities are not in a position to take over this work and that the ground-water activity cannot be adequately continued on a State or local basis, but rather must be a part of an integrated national plan."

Cordially yours,

Ray Fuller

Ray M. Fuller, Chairman

Employing an Engineer-Prospects and Training

The April American Engineer contained a discussion of various questions which the young graduate engineer asks when seeking a position and which the employer frequently seeks to answer when formulating a hiring policy for engineering employees. The answers given are based on a report of the Joint Committee on the Economic Status of the Engineer which is the result of a preliminary survey conducted by the group. The discussion is continued here with particular reference to demands for engineers in industry during the next four years, the engineers' role in company development, his chances for executive and management positions, and the employers' view of present day engineering education.

Personality is the greatest single factor considered by employers in hiring young engineering graduates, it was revealed in the April *American Engineer*.

This statement is based on a report recently issued by the Joint Committee on the Economic Status of the Engineer of which William F. Ryan, NSPE, is a member.

Other Factors

Other important factors considered by the employer, in the order of their importance, are : (2) and (3) scholastic record and indicated promise of development in specific engineering fields; (4) engineering experience; (5) evidence of ability to cooperate with others; (6) recommendations of qualified people; (7) indicated promise of executive development; (8) standing of college from which candidate was graduated, and (9) salary requested.

It was also found, on the basis of information contained in the report, that the instrument, electrical, petroleum, chemical and aircraft industries employ the greatest number of engineers while colleges employ the largest percentage of such employees.

Young engineers going into industry for the first time will receive an average salary of $207 a month ranging from an average low of $198 for colleges to an average high of $210 for those entering the machinery, building, paper, glass utilities, metals and coal industries.

Chances of advancement for the young engineer are good, with pay increases coming from 6 months to two years after original employment. Many employers make periodic reviews of their engineer employers salaries and other's rely on recommendations of superiors to guide them in advancement.

It was also indicated that a majority of employers prefer to hire and train young graduate engineers, although the supply is so limited that many have had to employ more experienced men.

These findings, it must be pointed out, are based on a preliminary survey which was made by the Joint Committee and therefore, do not necessarily represent final answers to the many questions which are asked by employers and job seeking engineers from time to time. However, they do provide a clue to the final answers which may be presented when the Joint Committee completes its work. This also applies to the additional findings of the Committee which relate to future needs for engineers, adequacy of present college training, deficiencies which are frequently found in college graduates and other important items which bear on employment in the engineering field.

Need for Engineers During Next Four Years

Over the next four years an average annual increase in the number of engineers employed of about 8 per cent is expected by the 104 firms questioned. It is expected that by 1950 (questions were asked in mid-1946) the engineers employed by the reporting firms will have increased about 31 percent (weighted average).

The machinery, building, paper, glass, utilities, metals and coal industries expect to increase their employment during the four year period by about 34 per cent—the largest increase expected.

Colleges anticipate an increased employment of only 23 per cent—the lowest.

Instrument, electrical, petroleum, chemical and aircraft industries estimate an increase of 32 per cent, while the textiles, soap, rubber, automotive, shipbuilding, transportation and food group expects to employ 26 per cent more engineers than at present.

Role in Company Develpoment

Most of the reporting firms indicate that the engineer is "very important" in the development of the company. 100 per cent of the colleges indicate that he is such, while the following percentages of other groups agree:

	Per Cent
Instrumental, electrical, petroleum, chemical and aircraft industries	90
Machinery, building, paper, glass, utilities, metals, and coal industries	77
Textiles, soap, rubber, automotive, shipbuilding, transportation and food industries	65

An average of 80 per cent of the reporting firms believe the engineer is very important in the development of the company.

Most of the reporting firms—59 per cent—believe the engineering graduates chances for advancement are "greater than ever." However, only 42 per cent of the firms in the textile, soap, rubber, automotive, shipbuilding, transportation and food industries' group subscribe to this theory.

Firms in the instrument, electrical, petroleum, chemical, aircraft, machinery, building, paper, glass utilities, metals and coal industries are more inclined to believe that engineering graduates have "better potential opportunities" for advancement than other employees with comparable educations. However, only 45 per cent of the reporting firms in the textile, soap, rubber, automotive, shipbuilding, transportation and food industries subscribe to this, while reporting colleges are split on the question 50-50.

Technical and Profesional Development Programs

Only 50 per cent of the reporting firms indicate that special provision is made for professional development of their young engineers, but practically all declare that their organizations provide opportunities for professional advancement.

Thirty-seven per cent have formal training programs for young engineers; 65 per cent vary jobs to provide broad training; 41 per cent provide technical programs within the company; 78 per cent encourage taking

courses outside of company hours, and more than half of these contribute to the tuition for such courses. Some firms offer more than one of the above programs.

Furthermore, practically all reporting firms encourage membership in engineering societies. Nearly 30 per cent pay dues of certain employees in certain societies. Traveling expenses are usually paid by employers for attendance at meetings when the engineers are authorized to serve on committees, prepare papers, present discussions, and the like.

Data on College Training

Is the present college training of young engineers satisfactory? Eighty-three per cent of the reporting firms voted yes, 14 per cent no.

Among the 14 per cent dissenting, young engineers were criticized for:

1. Lack of fundamentals (physical sciences and mathematics).
2. Inarticulate speech and writing.
3. Lack of education in humanities.
4. Lack of drafting and design experience.
5. Lack of knowledge of economics and business.
7. Lack of knowledge of operation and procedure.

The Committee also called attention to a report of the Compton Committee* which was published in September, 1946, and which differs from the above findings in some degree.

In response to the question: "What is your opinion of engineering graduates," the Compton group received the following answers:

	Per Cent
Excellent or very good	12
Satisfactory	38
Deficient in certain particulars	35
No opinion	15

It will be noted that a considerably larger proportion of the firms questioned by the Compton group felt engineering education to be deficient. The criticisms which the 35 per cent in this sample leveled at training of engineers can be group in the following deficiencies:

	Per Cent
Human relations	9
Use of English	9
Accelerated courses graduates below par	7
Lack practical perspective	5
Lack training in business	2
Lack ability in design	2
Training too theoretical, needs broadening	2

Engineers as Officers and Executives

If existing ratios of graduate engineers and employees with other training who are officers or executives is maintained, the young engineers' chances of becoming either one or the other are good. 42 per cent of all executives in the reporting firms are graduate engineers while 37 per cent of their total officers have had such training.

Seventy per cent of all executives and 52 per cent of officers in the reporting colleges are engineers. The other reporting groups break down as follows:

	Percent Execs.	Ofcs.
Instrument, electrical, petroleum, chemical, aircraft industries	41	39
Machinery, building, paper, glass, utilities, utilities, metals and coal industries	48	41
Textile, soap, rubber, automotive, ship-building, transportation and food industries	23	24

The Joint Committee is aware of the report, its shortcomings and recommends that it be used with reservations until a more comprehensive survey can be made. The report is concluded with the following statement:

"It is recognized by the Committee that the data are of limited scope and therefore, should be accepted with some reservations.

Forthcoming Report

"The forthcoming report of the EJC Committee on Survey of the Engineering Profession should be awaited with much interest by all who have responsibilities relating to the engineering graduate.

"This Committee recommends to the EJC that a better and more complete questionnaire be prepared and a more extensive survey be made along the line in which this trial survey was directed, in the near future, say the fall of 1947.

"The Committee will be pleased to receive suggestions and cooperation toward the preparation of such a complete survey from anyone."

*The Outlook in the Demands for and Supply of Engineering Graduates, Journal of Engineering Education, V. 31, No. 7, Sept. 1946.

ASME Plans Giant Meeting in Chicago

Charles E. Wilson, of Detroit, president of General Motors Corp., and Robert R. Wason, of New York, chairman of the board of the National Association of Manufacturers, and president of NAM last year, will be among the speakers at the Semi-Annual Meeting of The American Society of Mechanical Engineers in Chicago, June 15 to 19. Total registration for the five days is expected to reach 3,000 exceeding previous records. The Stevens Hotel will be headquarters.

100 Speakers

About 100 speakers and authors, including leading engineers, scientists, industrialists and educators, will take part in the four-day technical program, starting Monday morning, June 16. The program in general will feature the organization's 1947 theme: "The Engineer's Responsibility in Increasing National Productivity." There will be about 40 technical sessions.

Eugene W. O'Brien, of Atlanta, president of the ASME, widely known engineering consultant, technical publisher and educator, will speak at the president's luncheon Monday noon, on "Broader Vistas." Mr. O'Brien is vice-president of the W. R. C. Publishing Co. of Atlanta. He served the government as engineering consultant during the war, and is a former member of the engineering faculties of Brown and the Sheffield Scientific School.

Mr. Wilson is scheduled to speak Monday evening at the opening dinner.

ASEE Holds 55th Annual Meeting

The American Society for Engineering Education will hold its fifty-fifth annual meeting in Minneapolis, Minn., June 18-21.

The University of Minnesota will be host to the group during the four day session. President James L. Morrill of the University will address the opening session of the meeting which will be held in the Hotel Nicollet.

Other speakers during the meeting will include: E. S. Burdell, Chairman of Cooper-Union, on "Humanistic-Social Studies;" A. M. Buchanan of Washington University, on "May the Teacher of Literature Help?;" and W. B. Embler of Cooper-Union on "What Every Young Engineer Should Know."

The Human Side of Engineering

By W. Julian King

For the present purpose, an engineer may be defined as "a human being, with special technical training, engaged in the application of science to the solution of the material problems of society."

Starting originally with small groups of fairly well balanced human beings, the initial problem in the development of competent engineers was to provide adequate technical training. During most of the past century, efforts have therefore been devoted principally to the imparting of sufficient technical knowledge to enable each generation of engineers to cope with the rapidly expanding technologies in the several fields of engineering.

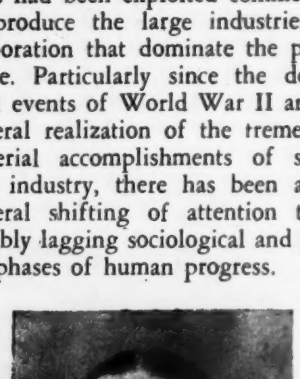
Technical Training Needed

Since the Industrial Revolution, this has been a task of the first magnitude. In recent years, the need for intensive and extensive technical training has been so pressing that some industries have established postgraduate courses, like General Electric's advanced course in engineering, and the major engineering societies have devoted many meetings and volumes of transactions to adult education in technical theory and practice. Especially since the turn of the century, engineering activity has been carried on at a feverish pace, with ever-increasing specialization and concentration upon mechanical, electrical, civil, and chemical problems—always dealing with inanimate things and the impersonal forces of nature.

Human Side Hitherto Neglected

The result has been the attainment of a high degree of proficiency in coping with technological problems of this kind, and the corresponding elevation of material standards of living. Relative to other fields of human endeavor, a pronounced salient has been projected in this particular area, culminating in the recent spectacular developments in aviation, electronics, and atomic energy.

Within the past few years, however, there has been a sudden and rapidly increasing awareness of the fact that the human side of engineering has been grossly neglected. In retrospect, it is now clear that this neglect has been due to the intense preoccupation with technological problems and to the tacit assumption that the human and sociological problems were of minor consequence or would somehow be worked out in the natural course of events. Unfortunately, the incentives for giving attention to these latter problems were not so impelling and the rewards were not so obvious, tangible, and attractive as in the case of the technical problems. Moreover, the human problems did not assume major proportions until after the successful solutions of the basic engineering problems had been exploited commercially to produce the large industries and corporation that dominate the present scene. Particularly since the decisive final events of World War II and the general realization of the tremendous material accomplishments of science and industry, there has been a very general shifting of attention to the notably lagging sociological and political phases of human progress.



W. Julian King

Director, Sibley School of Mechanical Engineering, Cornell University.

Address before Conference on Engineering and Human Affairs, Princeton University Bicentennial.

This new emphasis has been especially evident in three areas in the engineering world:

Civic Affairs

First, more attention has been paid to the need for greater participation by engineers in civic affairs, beginning with the local community and continuing up through state, national, and international politics. There has been widespread insistence upon the necessity for more help from engineers and scientists in matters of public responsibility. The atomic bomb, of course, has given a new sense of urgency to this need in respect to international relationships. The manifold abuses and shortcomings of applied democracy at practically every level in these United States have long provided a similar urgency in the domestic scene—to such an extent that it has become almost a commonplace that no first-rate individual of proved competence would be likely to accept a full-time position in public office. This situation was the occasion for the appointment several years ago by the ASME of the Engineers Civic Responsibilities Committee. Last April at the Midwest Power Conference sponsored by the Illinois Institute of Technology at Chicago, an entire general session was given over to a symposium on these problems, led by A. A. Potter of Purdue, Roy V. Wright of New York, L. J. Fletcher of Caterpillar Tractor, and other civic-minded engineers. Many engineers are completely apathetic to such matters, although there are encouraging signs of growing interest in several quarters.

Curricula Broadened

Secondly, there has been a significant shift in emphasis from the purely technical toward the "humanistic" subjects in the curricula offered by engineering colleges. This was very much in the air at the meeting of the Society for the Promotion of Engineering Education in St. Louis last June. It is now rather generally recognized that engineering education has not adequately prepared graduates to live interesting, useful lives as members of an increasingly complex society. Some universities, including Cornell, have already standardized a 5-year course for the bachelor's degree in engineering to provide more time for such subjects as public speaking, corporate and industrial organization, modern history, economics, psychology, and law.

The third area wherein the new em-

phasis upon "human engineering" has become notable is in the industrial world, where the individual engineer is frequently almost submerged in large corporate organizations. There was a time, not many years ago, when it was generally assumed that if a technical employee was assigned to a job with a reasonably well-defined responsibility at a salary in line with the prevailing of the industry he could be relied upon to adjust himself to his environment and work out his personal problems with very little further attention from the management. In fact, so many engineers did achieve a satisfactory integration of their own interests with those of the company—largely by apprenticeship to succesful engineering executives—that it was subsequently very difficult for them to appreciate the changing psychology of the younger engineers during the busy years of World War II. When unmistakable signs of restlessness and discontent began to appear among these young engineers, many of their elders oversimplified the matter by charging it entirely to a desire for higher wages. It has become abundantly evident, however, that the adjustment of the individual engineer to his environment in an industrial organization is a complex process, which requires considerable time and cannot safely be left to chance. In retrospect, it appears remarkable that so many engineers turned out so well when they were left almost entirely on their own resources in discovering the policies, principles, and practices of an industrial organization.

In this connection, the writer enjoyed an invaluable experience, several years ago, in serving on a sort of engineers' grievance committee in a large manufacturing unit. The function of this committee was to interpret the points of view and the problems of several hundred engineers to the management and also to transmit information in the reverse direction. This experience was supplemented by consultation with other engineers and personnel managers of various organizations in widely separated parts of the country. The substance of it is summarized in the following paragraphs.

Personal Problems Vital

The basic fact which has emerged with a new clarity and accent is that the proper handling of the human and personal problems of engineers is as vitally important to the success of their employer's organization as is the solution of major problems of design, production, and distribution, which have received so much attention in recent decades. Particularly in large corporations where the organization is complex and the distance between the individual engineer and the chief executive is relatively great, the loyalty, enthusiasm, and effective co-operation of "rank and file" engineers cannot be simply taken for granted in exchange for payment of salaries. It is equally important to understand that present-day engineers expect and demand more, in the way of professional standards of living, than their predecessors of a few decades ago.

Ideal Working Environment

The following list, originally presented to the semi-annual meeting of the ASME in Chicago last year, summarizes what the typical engineer employed by industry or government agencies seems to expect and need from management:

1. Leadership, in the best sense of the term, not paternalism on the one hand or neglect disguised as "complete freedom of action" on the other, but guidance in respect to major objectives and plans, inspiration, encouragement, and stimulation.

2. Not merely protection, but promotion of their professional and personal interests, at every opportunity.

3. Clear-cut assignments and responsibility.

4. The tools for the job, good ones.

5. Information concerning the background, present status, and future policies and programs affecting the work of their particular department.

6. Information, on company policies, rules, organization, practices.

7. Information as to how they're getting along in their work and whether their performance is regarded as satisfactory, or how it could be improved.

8. Information on methods of rating individual engineers.

9. Information regarding engineering salaries for various rating and lengths of service. It may not be regarded as advisable to release this, but the men want it nevertheless, and will frequently obtain it by their own resources, if not officially. They particularly want to know how their salary curves compare with those of engineers in other plants and comparable competitors in the industry and with wages of less skilled workers.

10. Fair salaries, all that the business should justify under efficient management, judged in relation to other groups as above.

11. Full information on other benefits and compensations. They must be sold on these.

Interest in Work

12. Evidence of interest in the work of individual engineers, as expressed by periodic reviews and appraisals; constructive criticism as well as praise; maintenance of discipline and accountability, instead of indifference.

13. Information on the technology of a man's particular field, from the literature, educational courses, attendance at professional society meetings, and contacts with other plants, laboratories, and field installations.

14. Good working conditions, ventilation, light, air conditioning, control of noise and dirt, well-maintained buildings, modern furnishing and facilities. Present-day engineers pay much attention to these things.

15. Freedom from petty annoyances, red tape, nuisance chores, parking lot rentals, too much fuss about occasional tardiness after working overtime.

16. Opportunity to express themselves in publications and attendance at technical meetings, to obtain recognition in their profession.

17. Reasonable stability of organization. Advance information as to why they are moved abruptly from one job to another. Square pegs in square holes.

Local Autonomy

18. Minimum of buck-passing by management, maximum local autonomy in handling personnel matters.

19. Opportunity to improve professional effectiveness and to advance by merit and individual effort.

20. Opportunity to discuss personal problems directly and privately with higher executives as well as immediate superiors, to feel that no one is blocking their way. Opportunity to advance by transfer to other departments or companies if not in their present jobs, especially when they have outgrown their present jobs.

21. Effective procedure for adjustment of grievances, including group discussions of common grievances.

22. Liberal policy in respect to sick leave, time off for personal business, and vacations.

(*Continued on next page*)

23. Other benefits such as group life and hospital insurance, pension plan, salary allotment payments for such items.

24. Opportunity for improving the professional standing and sociological status of the engineer, in collaboration with other engineers throughout the nation.

25. Participation by democratic processes in the formulation of company policies directly affecting them, at least to the extent of having a voice, collectively, in discussions, and some means for determining their own group opinions on important issues, such as collective bargaining.

Agencies Which Can Affect Progress

It is evident that furnishing all of this guidance, information, and opportunity requires very considerable talent and effort on the part of management. All too often neither the talent nor the effort is put into this part of the job. In such instances, the results can be—and have been—conspicuously bad as regards impairment of morale and effectiveness of the engineers. On the other hand, it is equally true that when management takes the proper initiative in catering to the legitimate aspirations of engineering personnel, the engineers are predisposed to respond by taking an enthusiastic interest in the objectives and welfare of the organization. They must be educated, however, in respect to the structure, the aims, and the operation of the organization. They must be told what is expected of them, as regards their dealings with their fellow workers and with outsiders, as well as with their administrative superiors.

As a starting point for further discussion, it is suggested that contributions toward the solution of the personal, professional, and economic problems of the individual engineer might be expected from several different sources:

1. The engineering colleges.

2. Industrial and governmental employers.

3. The national engineering societies, such as the ASME, AIEE, AIChE, etc.

4. Collective bargaining agencies.

5. A unified national society on the professional level, integrating the nontechnical interests of all engineers.

Five Responsibilities

(*Continued from page* 2)

I have pointed out to you where the impact of industrial organization tends to reduce the engineer to something less than a professional; but I have also tried to show you that industry is a prime factor in our social economy; and that if engineers will assume the responsibilities and duties proportional to their importance in society, the tendency will be to elevate their position to that of a professional. A more detailed study of these basic functions will show the importance of engineering.

Research Limited

(1) *Research* for the purpose of adding to the stock of basic knowledge is limited to universities and to a few large companies where funds and facilities are made available without a demand for immediate results. This type of research is done mainly by those who have had very intensive and usually quite specialized training in the basic sciences, such as chemistry, physics and biology. Included is the vast amount of military research that is going on throughout the country for preparedness purposes. This type of function is becoming very complicated as will be realized when you think of the push-button type of warfare that we probably face in the future. Opportunities in the military field are perhaps limited and in most cases require additional specialized training or experience.

The staff assigned to such research is, and should be, varied in training and experience. In order to benefit by existing pertinent information, some of which may be obscure, physicists, chemists, etc., are necessary; but in order to make the product practical and manufacturable, production engineers too are needed. If such a team is supported by competent technicians for model-making, you have an ideal setup for productive applied research.

Cites Research Project

I would like to cite an illustration. A need existed in our company for a magnetic compass to which our autopilot could be coupled for flying a compass course. For one reason or another existing compasses were unsatisfactory, so the job of inventing one was given to research. After a survey of various known means by which a plane's heading could be compared with the earth's magnetic field, a scheme which never had been used for direction detection was chosen as the most satisfactory. The plan was to produce a vertical cathode ray beam whose direction of deflection, with respect to the target, could be used as an indication of direction. The principle wasn't new but the application was. The work of design and construction which followed the conception of the idea was a cooperative venture with physicists, engineers and technicians all having a part in the development of what we think is a very excellent compass.

For the engineer with some imagination and an interest in new things such occupation is ideal. The fact that a research department is not held to as rigid production schedules as may apply to other engineers is an attractive feature.

Scope of Design

(2) *Design and Development* for mass production is the keynote of American prosperity and the prime factor of success in winning the last war. In the development function, engineers write the development specifications for a new device, survey and analyze related engineering data, design preliminary models, and perform experimental tests on the models to determine conformation with the specifications. Once a satisfactory functional model is produced, the device is redesigned for ease of manufacture and proper selection of materials. The test engineers then study the device for functional performance and endurance before accepting it for release for production. Our great talent for developing products on an interchangeable mass production basis will meet the keenest competition in the immediate future as other great nations seek to realign their economy to compete with ours for the world's markets. You men who choose design must advance this art if we are to maintain our present position of leadership.

(3) *Production Engineering* is the practical, or productive, field of engineering. The art of manufacture has advanced tremendously during the war years. The unheard of demand for high production has invoked technological improvements which otherwise would have been delayed for many years because of the capital investment required. You will remember that in

1941 when the President called for a production of 50,000 aircraft a year, the public thought it was impossible.

Wartime Performance

Actually the peak of production in 1944 was somewhere near double that figure, and it was the same with other necessary items such as ships, tanks, and munitions. Lenses and prisms were precision ground on production machinery for the first time. Aircraft and ships were manufactured for interchangeable sub-assemblies despite the apparent impossibility. There was not enough skilled labor to even begin to do the job. Engineers built the "skill" into tools and methods until semi-skilled and un-skilled labor could out-produce the craftsmen of Germany; and the Herr Doktor in German industry did not believe it could be done—not even after it had defeated his country. Henry Kaiser never produced a ship. Donald Douglas never built a plane. Such men provided outstanding administration, but engineers planned it and labor produced it! You men who choose production have chosen a field that will tax the abilities of any engineer; and your social responsibilities in an era when "automatic factories" are already being planned will tax your full professional status.

Educational Field

(4) *Application Engineering* is the educational field of engineering in industry. The best example of this field that I can find is the experience I had part in during the war, with the electronic autopilot that was produced by our company. At least 75% of the problem was the education and training of the personnel that had to use the equipment. Not only education and training but also vast amounts of promotional work were required to overcome the general lack of confidence in the 25c. radio tube, and reluctance to accept the fact that automatic machinery can fly an airplane better than a human being. In practically all cases this training and promotional work must have its foundation in engineering facts and knowledge.

(5) *Administration* is the executive function of engineering. It is in the last item on our list, the administration of engineering, production, and personnel work, that the engineer gets into the executive phase of the whole industrial operation. It is obvious that with the vast number of various functions and operations involved in a modern factory there must be a tremendous amount of coordination in order to tie all of these factors together and produce a common result. The engineer with proper training and business administration background is better fitted to perform this task than anyone else, since the major factors with which he must deal are scientific and technological in nature. I bring this out merely to emphasize the fact that you, as engineers, have the basic foundation for setting executive positions as your goals. However in order to attain these goals, you must have additional training in business administration. One of the big mistakes that has been made among engineers is that they have tried to, and in many cases have been forced to, assume executive responsibilities without training for it. It may be simply the fact that engineering is our first love and we refuse to make an effort to become expert in the problems of management. I don't believe we can emphasize the responsibility of engineers in an executive position too much, since it is obvious that the world is becoming more and more mechanized as time goes by, and certainly at an accelerated pace in the past few years.

The problem of administering these technological functions is becoming more and more important. The age old thought that the world may become so mechanized as to destroy itself may not be so foolish, especially when the mechanical Frankenstein is not properly controlled. Here again who can establish control better than the engineer? Certainly one must be able to understand the technical function before he can determine and control its proper use. It is along these lines that the administrative engineer owes a tremendous responsibility to society. To a large extent, he must assume responsibility for the proper functioning of industry within society—and for the safe use of industry's output. This is another reason for emphasizing professionalism and the characteristics and qualities of professionalism.

Professional Responsibilities and Privileges

When we speak of professionalism we find that the engineers in industry are the least professionally conscious. This is probably due to the fact that professionalism is very closely associated with registration and the tendency for the engineers in industry to register has not been very great. The reasons may be that in general there is no requirement for the engineer working for a large industrial plant to register. The legal requirements are satisfied if the over-all supervisor or the chief engineer is registered. This results in the fact that only a very few of the industrial engineers are registered.

This is an attitude among the engineers in industry that we must make every effort to try to correct because, after all, both our social and economic status depends to a very large extent on the professional consciousness of engineers.

Basic Analysis

A little basic analysis indicates very quickly that if we are to make our college education economically workable, we must receive a higher income throughout our fewer working years. Not only do we have a personal investment in our education, but also we have an obligation to society since society also has a substantial stake in the cost of our education. One of the main troubles with this situation is to ascertain how the person who has made this investment is to be distinguished from those who have not spent the extra effort for additional training. This is where registration and professionalism come in.

The term "professional" defines a preferred status granted to the person who has spent the extra effort and investment to train himself for a necessary higher function, and who takes great care to act in the best interest of the public without abuse of his advantage. It is for this reason that we must be on the constant alert to establish and maintain the professional status which rightfully belongs to us, and it is in the category of the engineer in industry where the most effort is required.

Compensation of Engineers

The "artisan" or "professional" question is also involved in the compensation of engineers. I hope that none of you will sell your heritage for a mess of pottage.

When medical men meet together they complain of the high wages of engineers, lawyers, and carpenters. The lawyers belittle their reward compared to doctors, engineers and carpenters. And the engineer bewails the unfair advantage of the others.

Look up the facts for yourselves and you will find that the median life income of graduate engineers, doctors and lawyers lies within a ten per cent spread. Of course, not all engineers

(*Continued on next page*)

(*Continued from preceding page*)

perform work of equal value nor do they receive equal compensation; but here are some figures to think about. The *average* engineer will double his starting salary in seven years and triple it in fifteen years. He will start 25 per cent higher than the lower 10 percentile and 19 per cent lower than the upper 10 percentile. In his tenth year he will be 54 per cent above the lower group and 47 per cent below the upper group. in his fifteenth year he will be 85 per cent above the laggards and 58 per cent below the leaders. Thirty years after graduation there will be a 50-to-1 ratio between the very highest men and the very lowest. Consider this in deciding between becoming a technician or a professional.

Tips From Experience

In my experience, I have found that the young engineer has some difficulty in making the transition from university life to employment at his first jobs in industry. Before closing, I would like to give for your consideration a few tips which may help you avoid some of the mistakes frequently made by young engineers in industry.

First of all be honest. Honesty and sincerity are prime requisites of ethics of professional engineers. It is through honesty and sincerity that you build up confidence with your employer and the public. Remember the public has a large stake in your college education and it deserves fair, honest treatment in return.

Be cooperative. Remember cooperation is the keynote of modern industry.

Screen your ideas. You will have hundreds of them and they cannot all be good. So, be your own censor in order that your final suggestions may be practical. One impractical suggestion may cast suspicion on later good suggestions for some time and will not help to build up other peoples confidence in you. *Five hours* of your time spent in answering your own questions may save your supervisor from answering them in *five minutes* and remembering the effect for *five months*.

Use your initiative and encourage your ambition, but not at the other fellow's expense. You will advance further by efficient teamwork on assigned tasks than by hogging the show for short term gains.

Be loyal to your fellow workers, supervisors, employer, and all the people working under you. They will respond remarkably to such treatment.

Give credit where credit is due. This is another item of honesty.

Be friendly, modest, and cooperative with every one with whom you come in contact. Every friend is a valuable asset.

Seek Knowledge

Seek knowledge on every subject; but don't give it unless it is requested or wanted. The world is full of know-it-alls and woefully short on real knowledge and understanding.

Take time out to explain the mechanical details to men under you. Five minutes' time explaining how a device works will gain you a friend for life and will build up confidence in you as an engineer.

Demand and obtain your rightful fair treatment and compensation in a firm and dignified manner, free of personal recriminations and mistrust.

Support and take part in your professional guild or technical society. That society will then reflect your needs and aid your progress.

Set yourself a goal and work steadily to attain it. You cannot navigate without setting a course.

Plot your progress in valued contacts made, responsibilities assumed, experience and compensation. You cannot check your course without a compass.

In Summary

I have tried to outline a picture for you—the position of the enginer in industry. I have shown you influences that tend to reduce you to something less than professional, and I hope that I have shown you opportunities that can elevate you to a position of respect and honor in society—a position that all real engineers will strive to attain.

Engineers and Finance

(*Continued from page* 6)

der our kind of government, the form of a striving for business gain. It has been channeled thus, so that its force is not disruptive of society. We can call it the profit system or, as I have suggested, the profit and loss system.

Other men under other systems of government, in all ages, have had this urge for personal advancement, and it has not infrequently led to a drive for power, and thus to oppression and tyranny. It has become destructive, like the jets of steam from a volcano, instead of like the steam in the boiler header of a turbine plant—constrained and dedicated to a purpose.

We must from time to time in our busy lives pause and examine what it is that lies behind our business system. Engineering is classed as one of the learned professions. Its practitioners should be capable of philosophic contemplation, which is the hallmark of an educated man.

Business a System

The engineer should never let himself become a technician only. We perceive that modern business is only a system, and it is not sacred in itself, as some of its vociferous defenders seem to think. Neither is a machine sacred. We do not view the airplane as does a primitive tribesman when one first comes into his view. We do not worship it. The modern steam turbine is not sacred. The test we apply to it is: Does any other machine do the work so efficiently, i.e., so well? The engineer is not disposed to discard the steam turbine as a prime mover until something better comes along.

Preserving Freedom

The political philosopher—who in the future may and should be a trained professional engineer—should apply the same test to our financial system. Obviously it takes experience and judgment to do so, and these qualities are not developed overnight.

From personal experience—27 years of it—including much work in foreign countries, I can say, without fear of contradiction that our business system is the best that man has yet devised to minister to his material wants. It may not be perfect, and as a matter of fact it is always being adjusted and altered, but it does work, and the engineer has a huge stake in it. As a professional man he can be instrumental in preserving the great degree of freedom and prosperity that we as a nation enjoy,—Our Democracy.

Engineers know it is difficult to plumb the upper floors of any structure, when the foundations on which they rest are unstable.

No man, and no nation ever got lost travelling a straight road.—A. Lincoln.

Employment Prospects

(*Continued from page* 8)

gineer. Perhaps brick-layers do not have steady employment the year round, but at such salaries they can afford to be on a vacation half of the time.

Seeking Inspector

Recently the secretary of the New Mexico Society of Engineers received a phone call from a man seeking a graduate electrical engineer with about three years experience to fill an inspector's position on a large job. The secretary replied that he knew of no one with these qualifications who might be available, and inquired as to the possibility of promoting an electrician to the inspector's job. The out-of-state man said, "What are you trying to do, kid me? The electrician's salary is $450 per month, while this engineering position pays only $175. I doubt if a tradesman would consider that a promotion." It seems that the craftsmen have fared far better financially than the highly educated engineers.

We have been invited by the American Federation of Labor to join their craft unions such as the International Federation of Technical Engineers, Architects, and Draftsmen, and some professional engineers have accepted this invitation. This particular union is already organizing the under-graduates that are actively enrolled in technical phases of engineering and architecture at schools, colleges, or universities *of recognized standing*. The student initiation fee is $3.00 and the dues are 50 cents per month. Eligibility is limited to students in institutions of *recognized standing*. It would be enlightening for the different universities in the country to find out if they are accredited by the American Federation of Labor, and if so, why?

Have Avoided Unions

For the most part, the professional engineers have avoided joining such unions, contending that it is undesirable to have a collective bargaining group composed of both professional and non-professional men. As unions stand now, professional employees are a small minority in the midst of a larger group of lesser trained personnel with no mutality of interest.

It seems logical to conclude that it is the duty of engineers to unite into a professional cooperative bargaining group, whose duty would be to raise the wage scale of engineers to a level comparable to that of other professions. The American Medical Association has never been considered a trade union. There is no reason for the engineers not to organize as the doctors did so effectively many years ago. An organization such as the National Society of Professional Engineers, which now has 26 state affiliations, should organize the engineering students into student chapters while they are still in school. When the students graduate from college they should be incorporated into the association as "engineers-in-training." When the engineer completes his "engineer-in-training" period he should automatically become a full member of the organization.

Some states require that the graduating engineer take examinations covering technical subjects upon completion of their studies. After four years of experience another examination covering practical subjects is given. If the engineer passes both tests, he becomes a Registered Professional Engineer.

Civil Service Rules

Assuming the organization is functioning for the better interests of its engineering members, the first logical step to protect the reputation of the engineering profession is to bring about a change in the Civil Service requirements. It is suggested that these requirements be revised to incorporate the following requisites in order to qualify for employment as an engineer in any field.

1. Graduation from an accredited engineering college.
2. Registered Professional Engineer.
3. A combination of both.

An alternative solution would be to require as a condition for entering Government service in P-1 Grade, that the candidate be either an "engineer-in- training," or a registered professional engineer in any state. Then in order to be promoted to a P-2 Grade, he would have to be a registered professional engineer. This plan would impose no hardship on the practical engineer who has worked his way up from the bottom. If he is qualified to work for the government, he should be able to pass the registration examination.

It is time that engineers consider themselves first as engineers, and then as civil, mechanical, electrical, or chemical engineers. The fact that there are so many engineers, and engineering societies, has been a drawback which has impeded the development of a unified profession.

Engineering Registration Laws have provided the real basis for a unified profession. Now we need a strong National Society. If we do not organize our average incomes will continue to be less than those of the artisan group. *It is not a matter of preference, but one of necessity. We must either give up engineering or else we must organize.*

DCSPE Dines Congressmen

The District of Columbia Society of Professional Engineers, in cooperation with the local founder societies gave a dinner April 24, for the engineers and architects who are members of Congress.

Of the eleven members of the House and Senate who are either engineers or architects, only Representatives Gordon L. McDonough (R) of California, Carl Hinshaw (R) California, Frederick A. Muhlenberg (R) Pennsylvania, and Paul Bartram Dague (R) also of Pennsylvania were able to attend.

Prominent Guests

Prominent guests who attended the dinner included: Mr. Fischer S. Black, who was chairman of the Committee on Arrangements; Eugene W. O'Brien, president of ASME; Clarence E. Davies, executive secretary of ASME; Frank J. Hanrahan, president of D. C. Council of ASME; Paul H. Robbins, executive director of NSPE; F. W. L. Hill, vice-president of D. C. Council of NSPE; Dr. B. M. Woods, president of ASHVE; and Mr. Paul Wooton of the White House Trade Press Correspondents Association.

Members of Congress who were unable to attend are: George P. Miller (D), Representative from California; Clayton Douglas Buck (R), Senator from Delaware; Millard E. Tydings (D) Senator from Maryland; George W. Malone (R), Senator from Nevada; James J. Heffernan (D), Representative from New York; Augustine Bernard Kelley (D) Representative from Pennsylvania; and Ralph E. Flanders (R) Senator from Vermont.

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Kindly report any errors or omissions to the Editor

National and State Society News

News From the Washington Office

Membership in NSPE continues to grow. We have now actually passed that 15,000 mark, having as of April 30 a total membership of 15,342. This represents an increase of 371 members during the month of April, which isn't fast enough to meet our year-end goal of 25,000.

Paul H. Robbins

However, it is felt that the full effects of membership campaigns in the various states have not yet reached the Washington Office and hence, our goal of 25,000 by the end of December can yet be realized.

Annual Meeting

And speaking about December, it may seem a little early to be talking about the annual convention, but your Washington staff is now making plans for a bigger and better meeting than NSPE has ever had.

President Ritchie Lawrie, Jr., was in Washington during the month to discuss these December plans, among other things. A program of interest to all members is being planned. Every member will want to be there.

An excellent program for the ladies including entertainment, shopping, and other items is in store. President Lawrie has expressed the opinion that getting the ladies to the convention is highly important, because if they are present, the men are certain to be tagging along with them.

Arrangements Chairman

Edward J. Nunan of Buffalo has been appointed by President Burke of the New York State Society as chairman of arrangements. He and his committee are already busy.

The New Jersey Society held its annual meeting on April 11 and 12 in the Essex House in Newark. It was a big show with many engineering exhibits depicting professional engineering progress throughout the year and with many fine speakers. And then on May 2 and 3 the New York Society followed with its annual convention and an equally impressive show.

Your executive director attended both conventions, making brief speeches on the activities of the National Society and wants to take this opportunity to congratulate both groups on their fine meetings.

Your executive director also addressed a meeting of the Washington, D. C. Section of AIEE on April 8, when the subject of organization of the engineering profession was discussed.

On May 1, President Lawrie attended the Philadelphia Chapter meeting of the PSPE as guest speaker. His topic: "Professional Recognition for Engineers Through a Single National Society."

On the legislative front, your executive director and legislative analyst have continued to maintain a close watch on labor developments. Reports of these activities have been made regularly in the Legislative Bulletin, copies of which are being sent to each chapter of the Society.

Illinois Secretary

The Illinois Society has, for the first time, a full time field secretary. He is M. T. Holloway, and the Washington Office of NSPE wants to wish him success in his new undertaking.

The New York Society has a new executive secretary in the person of George H. Barrows who replaces Frank Duck. Mr. Duck has held the position for the last year and one-half. We want to wish Mr. Barrows success in his new position and at the same time extend best wishes to Mr. Duck.

WSPE Exhibits Oil Painting

A large oil painting showing the contribution of engineering to health was exhibited by the Milwaukee Chapter of the Wisconsin Society of Professional Engineers at the Health Show, Milwaukee Auditorium, May 15-18.

The picture was painted especially for the occasion by Dr. George E. New, world renowned Milwaukee artist and lecturer.

On a lectern below the picture the pages of a large book, open for all to see, contained the story of engineering and health. Pure water in abundance, eye-saving illumination, safe and comfortable building structures, therapeutic devices and doctor's instruments are some of the gifts of engineering to the better health and welfare of man.

The Wisconsin Society of Professional Engineers includes registered engineers of all technical branches and is affiliated with the National Society of Professional Engineers. The newly organized Milwaukee chapter numbers 275 members. Mr. Glenway Maxon, Jr., chairman of the public relations committee, arranged for the exhibit.

Other "New" Exhibits

Dr. New is particularly well qualiged to interpret engineering with his brush. By heredity and by early environment he was brought up in the best engineering tradition. He has a doctor's degree in art and archaeology from the Sorbonne, Paris. His reputation as an etcher and portrait painter is international, his works having been shown in the Metropolitan Museum of Art, New York, the Library of Congress, Washington, D. C., and in numerous European galleries.

Dr. New recently completed a portrait of the late General Billy Mitchel, whom he as an air force pilot knew during World War I.

CONNECTICUT

The Connecticut Society of Professional Engineers held its Board of Directors meeting Wednesday evening, April 9th, at Elm House. Milford.

A report by Carl Gotthardt, Chairman of annual meeting committee revealed the affair to have been a social and financial success.

Several new members were admitted and chairmen of standing committees for the ensuing year were named, as follows: Ethics and Practice, A. S. Lynch of New Haven; Membership,

(*Continued on next page*)

Coming Events To Remember

National Meetings

July 11. State Secretaries Conference, Statler Hotel, Washington, D. C.

July 12. NSPE Board of Directors Meeting, Statler Hotel, Washington, D. C.

(*Continued from preceding page*)

A. E. Cooke, New Haven; Chapter Activities, Carl Gotthardt, Bridgeport; Resolutions, W. Furber Smith, Hartford; Public Relations, Gerald Phelan, Bridgeport; Publicity, Edwin S. Osteyee, Bridgeport.

Re-arrangement of Chapters as proposed by those in the areas mostly concerned was approved and it is probable that there will be a Fairfield County Chapter in place of Bridgeport, Norwalk and Stamford Chapters, a Hartford County Chapter that will include the membership of the northern and eastern part of the State and a New Haven County Chapter in place of the Waterbury and New Haven Chapters.

This should give the chapters more strength and insure larger meetings which will encourage better speakers and programs.

An Executive Committee was chosen to take quick action on pressing matters and it was voted that the President, the Treasurer, the Secretary, the National Director and the Presidents of the various Chapters should serve on this committee.

GEORGIA

Last December, during the annual NSPE convention in Atlanta, Ga., the tragic Winecoff Hotel fire took place. Its tragic toll of life had a very sobering effect on those present—and particularly on the Georgia Society.

It brought into proper focus as perhaps nothing else could, the obligations of the professional engineer to the public.

As a consequence, the Georgia Society went to work. It has maintained a fight for protective legislation ever since the tragedy occured. In April, after many persons have forgotten the fire, the Society is able to report success in its battle for legislation. A letter from President C. L. Emerson appears in the April News Letter of the Georgia group as follows:

"We are able to advise you with a considerable feeling of satisfaction that the Gowen Bill entitled 'An Act to Provide Regulations to Protect The Occupancy of Buildings in This State,' etc., etc., numbered House Bill No. 191 was passed at the recent meeting of the General Assembly and has been signed into law by the Honorable M. E. Thompson, Governor. This is the Act designed to prevent a recurrence of such disasters as the Winecoff Fire.

"The Legislation as passed is substantially that prepared by our own GSPE Committee under the Chairmanship of Mr. Harry C. Robert, Jr. The Legislation Committee under the Chairmanship of Mr. J. E. Mellett was active in securing this particular legislation rather than certain other proposed bills which our Board considered either ineffective or positively harmful. This Bill, we believe, will not only save hundreds of lives in the future, but will also increase the acceptance of the professional status of our membership.

"We have requested Governor Thompson to permit us to make suggestions as to the composition of the Building Safety Council which is to consist of seven persons as defined in the Act. The President is requesting the various Chapters to make suggestions, as this Board should be representative of the entire state of Georgia. It is not only an important body at this time, but we believe will continue to grow in importance in the future.

Southeast Georgia Chapter

"On the evening of April 15 the first official meeting of the Southeast Georgia Chapter will be held with dinner at 7:30 at the Ware Hotel in Waycross, Georgia. Mr. Robert L. Pittman, President of the Southeastern Brick Company, Inc., who is President of the new Chapter, will preside. An address will be made by Mr. Alan G. Stanford, vice-president of the National Society of Professional Engineers. Also, Mr. Harry C. Robert, Jr., will discuss the provisions of the Gowen Bill. The writer will be present as the President of the State Society and Mr. Charles E. Layton, who had so much to do with the formation of the Southeast Georgia Chapter, will present the Charter to President Pittman. It is hoped that quite a large delegation of other officers and Committee chairmen will make the trip from Atlanta and from other Chapters to be present at Waycross for this most enjoyable occasion.

"The National Society has formulated a comprehensive program to assist in building up the membership of the various State Societies. Our Membership Committee with Mr. George M. Normandy as Chairman is cooperating actively in this program and we earnestly solicit the active help of each Chapter in obtaining more members, which will enable us to exert an increasing influence on State and local affairs. We still have not quite reached our goal of having in our membership over fifty per cent of all engineers licensed in the State of Georgia. Your President certainly hopes that this can be accomplished during this year.

Sincerely yours,

C. L. Emerson, President."

ILLINOIS

M. T. Holloway has been appointed field Secretary for the Illinois Society of Professional Engineers in line with the recent authorization to employ such a full time person.

The American Engineer wants to take this opportunity of congratulating Mr. Holloway and wishing him good luck in his new position.

MARYLAND

Col. Michael J. Blew spoke at the April meeting of the Maryland Society on the subject "Privileges of the American Citizen." His address was in part as follows: "The privileges which we enjoy as a people were gained for us by the sacrifice and toil of our forefathers. Personal liberty was their desire and is a desire possessed by all. To those who sacrificed in order that we may enjoy our present freedom we owe a great debt. No other nation in the world grants such broad privileges of freedom as we enjoy in the United States.

"To retain our freedom we must be self reliant, and self reliance must come from within. We must help the young to work for and appreciate this freedom, and to develop their self reliance; we must work for our privileges or we shall lose them."

* * *

Engineers, as members of a learned profession, can do much to assure the continuation of our privileges. There are certain inherent responsibilities to be taken by the individual, however. Among them is obedience to law; in this connection the engineer should do his part in seeing that proper laws are enacted. To this end he should vote, and furthermore know the man for whom he is voting. Other responsibilities are jury duty, serving as a witness, work on civic commissions, and with civic organizations, slum clearance programs. Each should give, not only take. In all these activities the engineer should keep in mind that the greatest good for the greatest number is the right ideal to support.

These activities take time and effort but engineers who are a selected lot of men must give of their time and effort. In the past engineers have kept too much to themselves. The National Society of Professional Engineers, which represents the engineering profession as a whole, aims to expand the influence of the engineer in the civic, legislative and social field in order that his methods of analysis may be applied to the problem which must be solved if we are to continue the privileges which have been bequeathed to us by our forefathers."

Senate Bill No. 480 amends the Maryland Registration Law for Professional Engineers making this Law more effective. At the April meeting it was recommended that each member of the Maryland Society of Professional Engineers write Governor William Preston Lane, Annapolis, Md., asking him to sign this bill. A letter has been forwarded from the office of your Society on behalf of the Society asking the Governor to sign this bill.

MINNESOTA

The Executive Committee of District 4, MAPE, met on March 6 and appointed committee chairmen as follows: Legislative, M. W. Carley; Employment Practices, P. C. Bettenburg; Interprofessional, Edward F. Jones; Constitution and By-Laws, Myron L. Jones; Speakers Bureau, James E. P. Darrell; Membership, George B. Townsend; Junior Membership, Fred Aichinger; Historical, George Roden; Press Publicity, W. S. Cockroft; Registration, W. S. Cockroft; Engineers in Industry, J. W. Skovholt; Education, J. J. Ryan; Civil Service, George Guesmer; and Program, Theodore Thomas.

District 8 of MAPE voted at its March 22 meeting to inform Congressman Blatnik that it favors the Hinshaw Bill, designed to amend the National Labor Relations Act to give engineers freedom of choice in selecting their collective bargaining agents.

NEW YORK

Edward T. Crinnion, Chairman of the Nominating Committee of the Bronx County Chapter has announced the following nominations for the June, 1947, annual election: for president, Joseph A. Brunner; 1st vice-president, Edward T. Crinnion; 2nd vice-president, Edward B. Fitzpatrick; secretary, Sylvester W. A. Murphy and treasurer, Harrison Blankstein.

Arthur Benline, Solon E. Friedeberg, Julius Harwood, and Henry G. Vermont have been nominated for three year terms as directors.

The New York County Chapter held a detailed discussion of the minimum salary scale which was adopted for professional engineers two years ago at its April meeting. It was voted to increase the figures in the old scale 37.5 per cent, which will mean a minimum salary for experienced professional engineers slightly in excess of $6,000 a year.

During the discussion, several speakers expressed the opinion that adoption of a minimum salary schedule was meaningless because employers pay no attention to it. Gregory Shea, replying to these charges, suggested a scheme whereby all professional engineers would accept employment only in positions listed with the Society. Such listings would be made by employers having openings and a salary evaluation committee would reserve to the Society the privilege of refusing to list a position if the salary involved was too low. Under this scheme, since all of the best engineers would be members of the Society, employers would find it desirable to list their openings.

An informal vote on the suggestion revealed wide support of the idea.

OHIO

Alex Van Praag, Jr., vice-president of NSPE, addressed the Dayton Chapter of OSPE at its February 17 meeting on the subject of "The Professional Engineer and Collective Bargaining."

In part, Mr. Van Praag said:

"Ways and means of perpetuating, expanding and improving the profession of engineering as a learned profession, and of justly elevating professional recognition in the eyes of the public have been considered for several years. The NSPE and other principal professional societies have fully recognized this problem, and also the problem now facing the profession as regards organization for or against collective bargaining. What to do about the latter has been a major problem. Some of the societies have taken relatively radical steps, even to the extent of attempting the formation of competitive unions composed of professional employers. Such efforts have not been and cannot be effective. There are many reasons why. NSPE on the other hand has diligently studied the problem and sought a more professional approach to its solution and has refused to be stampeded into ill-advised courses of action.

"One of the solutions promptly suggesting itself to the profession was to revise national labor legislation as regards the professional man. This seemed earlier to be a vain hope and a course both 'too long and too late.' Another solution which looked logical was to arouse the profession and the public to the imminent danger, and to unify and to organize the profession on a professional basis. Although a long and difficult course, this latter seems most logical.

"The NSPE has recognized the situation which has suddenly presented itself in the form of an opportunity to amend the national labor legislation and, in cooperation with other professional and technical society groups, has recently proposed an amendment to the National Labor Relations Act and has asked for changes in its administration and in the administration of the Fair Labor Practices Act, all directed to insuring that professional employees shall have full freedom of choice in selection of collective bargaining representatives and joining or refraining from joining labor organizations, and to assure freedom of relations between management and employees."

The Akron District Society of OSPE has been concentrating on its public relations, and with no small amount of success. The group has been getting big displays in the local newspapers.

The group seems to have found the right formula of supplying the papers with timely information of public interest.

The Maumee Valley Chapter of OSPE was addressed at its April meeting held in Lima by Dean Alex R. Webb of the College of Engineering, Ohio Northern University, on the subject of engineering education.

Dean Webb is a civil engineer who, before joining the staff at Ohio Northern, was engineer for the Burlington Railroad and a professor at the University of the Philippines.

Apparently it is against the law for a bank robber to park beside a fire hydrant, and for a bootlegger to forget the payment of his income tax.

PENNSYLVANIA

It was reported to the Executive Board meeting of the Pennsylvania Society of Professional Engineers held in Harrisburg on April 19, that the revised salary schedule has been printed and is ready for distribution.

In commenting on this schedule it was pointed out that it provides for a cost-plus-basis of operation and was emphasized that despite the fact that this method of operation is thought to yield an assured profit there should be no tendency to reduce the established margin.

Various laws pending before the Pennsylvania Legislature were also discussed during the session.

The Erie Chapter held a joint session with the Northwest Chapter of the American Institute of Architects on April 16, 1947.

The unplanned discussion included the topics of building codes, mechanical and electric equipment, architect-engineers relationships, municipal problems, labor problems and other subjects. A discussion designed to discourage the practice of "free" engineering and architecture furnished by banks, manufacturers, fabricators, jobbers and sales representatives, except in specialized merchandise as a service to professional engineers and architects instead of to the consumer market, was also held.

The Lincoln Chapter had such success with its March guest night in Lancaster that it decided to hold a repeat performance, this time in York. The meeting was addressed by Captain John Houston Craige, graduate engineer turned newspaper correspondent and lecturer, on "The New Russian Imperialism."

The Philadelphia Chapter held an "extra colossal" May 1 meeting with NSPE President Ritchie Lawrie, Jr., as speaker of the evening. His topic: Professional Recognition for Engineers Through a Single National Society.

The monthly meeting of the Pittsburgh Chapter of the Pennsylvania Society of Professional Engineers was held Thursday, April 17, 1947.

The feature of the evening was a presentation of a film by the General Electric Company on Stream Pollution. Charles A. Finley of the Allegheny County Sanitary Authority presented the preamble of Stream Pollution Problems in Allegheny County, and then introduced Mr. David Olbum, Secretary of the Allegheny County Sanitary Authority, for further enlightment and discussion on stream pollution problems and aims.

President Christmas and Executive Secretary Costello, Pennsylvania Society of Professional Engineers, were guests at this meeting.

WISCONSIN

The Milwaukee Chapter held two dinner meetings during the month of February. Forrest Nagler, chief mechanical engineer for the Allis-Chalmers Company, on February 5th related his interesting experiences traveling to Kikini. Mr. Nagler, because of his participation in the design of machinery used at Oak Ridge, was invited by the army to witness the second of the atom bomb explosions. He went as a guest of the Navy.

On February 18th Lawrence E. Peterson, consulting engineer, showed beautiful color movies of a trip he and Mrs. Peterson took to South America last summer. The occasion of this enjoyable meeting was celebrated as "ladies' night" with an attendance of sixty at the Engineers' Society of Milwaukee Building.

The Ethics and Practice, Committee of the Milwaukee Chapter of the Wisconsin Society of Professional Engineers held its initial meeting at the Engineers' Society of Milwaukee Building, Friday evening, April 11.

The committee of which N. A. Blakey is chairman, will prepare a code of ethics and practice to be used for the guidance of the profession. It will also receive complaints regarding violations of the State Registration Act. Communications on this subject are invited and should be addressed to the Secretary Robert H. Hopwood, 724 East Mason St., Milwaukee 2, Wis.

New Committee Appointments

Two appointments to membership on the NSPE Practice and Ethics Committee have been announced by Ritchie Lawrie, Jr., National President. These appointments complete the membership of this important committee.

The two new appointees are: P. K. Pierpont of Bluefield, West Virginia and John F. Hale of Dayton, Ohio.

Heavy Water Sold by AEC

The United States Atomic Energy Commission has announced plans for distribution of heavy water and deuterium gas to qualified research institutions in the United States.

Distribution of these important research tools will be by the Stuart Oxygen Company of San Francisco under contract with the Commission. The Stuart Oxygen Company was engaged in distribution of heavy water prior to the war and is prepared to stock and distribute these products.

The Atomic Energy Commission said handling and distribution costs only were covered in the charges for the heavy water and deuterium gas. Heavy water was produced in connection with the atomic energy operations and now is available in sufficient quantities for domestic research purposes outside of the government's atomic energy program.

Applications for these new research items may be obtained from the Atomic Energy Commission, Research Division, Isotopes Branch, Oak Ridge, Tennessee.

Conversion Table

The Babcock & Wilcox Tube Company now has available a revised version of its linear table which converts inches and fractions of inches to decimal parts of a foot. The table (Technical Data Card No. 110A) should effect savings of time for those who deal with products, such as tubing, generally sold and quoted on a per 100 foot basis.

Headlight Glare

To block headlight glare from approaching automobiles, New Jersey Highway Commissioner Spencer Miller, Jr., is experimenting with evergreen planting on the Newark-Elizabeth section of Route 25 (U. S. 1).

This State trunk line, sometimes described as the world's most heavily traveled artery, was selected for the trial by the Highway Commissioner as part of his continued campaign to cut the heavy toll in roadway accidents. The test layout is in the safety island separators and is in the Elizabeth section near North Avenue.

What's New For Engineers

Requests for further information concerning any item mentioned under this heading will be promptly referred to the manufacturer. It would be appreciated if inquiries be addressed on professional or company letterhead.

Send Inquiries Direct to American Engineer, #6 Church Street, New York, N. Y.

OVERHEAD FOAM SPRAY DEFLECTORS

A new Overhead Foam Spray Deflector System has just been made available. The new equipment is sepecially effective over hazards where any flammable liquids are stored, where water sprays would tend to spread the flames, and where foam, instead, will quickly blanket and smother the fire.

The new Overhead Spray Deflectors may be placed over dip tanks and drainboards, to cover articles on conveyors, protect paint spray booths, oil and gasoline pump rooms, and loading racks for Diesel fuel or gasoline. Spray nozzles may be located over individual hazards or spaced equi-distant throughout the area to be protected. The new equipment may have its foam supplied either from a fixed independent unit which may be completely automatic, or it may be supplied through permanent piping with hose connections at the outer end hooked up with a special foam truck.

These new deflectors are made in three standard sizes for four different water pressures. Equipment consists of a brass foam maker with a steel discharge-tube and brass dispersion head. They fit standard pipe lines and are finished in red. Although generally assembled vertically onto overhead pipe lines with the dispersion heads down. the deflectors may be placed at various angles for special applications. Preferred operating pressure for all overhead spray units is 50 to 75 psi.

During development of the Overhead Spray Units, it was found desirable to break up the foam into small particles, light in weight, so that they might be dropped from a height of 8 to 10 feet onto a flammable liquid surface with minimum disturbance to the formation of the foam blanket. At 50 psi water pressure, the area protected by an overhead spray deflector varies from 47 to 190 feet, depending on the type model.

For further information address American Engineer, reference No. 611.

OIL FILTER ELEMENTS

Standard equipment for all types of lubricating systems is a new Oil Filter Element placed on the market recently.

These replacement filters consist of lint-free textiles wrapped in a closely knit muslin, pressure wound in convolutions around a perforated metal core, and covered with a heavy tubing or muslin jacket. The horizontal flow of oil from outside to inside through the laminated construction materially increases dirt and sludge removal. As elements absorb contaminants they expand, allowing greater dirt storage capacity and a higher saturation point than elements in metal containers.

It is claimed that the filters will not rob oils of their valuable additives. They may be used with any type of oil, regardless of its use or application. Replacement elements are available in 260 different sizes to fit all popular makes of filter cases. No adapters, springs, spacers or liners are necessary to make them fit.

The filters are said to be suitable for use in the automotive trade, in Diesel electric plants, in industrial applications for power plants, in machine shops for coolants and lubricating oils, in oil fields and pipe line equipment, for maintaining construction and mining equipment, for marine engines and pumps, farm power equipment and for hundreds of applications where dirt, grime and moisture in oil can result in a complete breakdown of engines.

For further information address American Engineer, reference No. 612.

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Sixth Edition 1947 692 Pages $6.50

German Research in World War II

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Discusses the background and fundamentals of German weapons research, its progress and organization. Especially interesting is the discrepancy between promising laboratory experiments on new scientific developments and their disappointing effects when put into actual practice.

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Russian-English Technical and Chemical Dictionary

Compiled by LUDMILLA IGNATIEV CALLAHAM

A scientifically organized reference to 80,000 terms, with a comprehensive coverage of organic and inorganic chemistry, and chemical technology and mineralogy. Also extensively covered are metallurgy, mining, geology, engineering, physics, botany, pharmacy, and the more common terms in agriculture, medicine, aeronautics, meteorology, and military science. The book includes those terms most frequently used by industrial technologists, as well.

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Introduction to Aerodynamics of A Compressible Fluid

By HANS W. LIEPMANN and ALLEN E. PUCKETT

This is the first broad and systematic study in English of compressibility effects in aerodynamics. Comprehensive in scope, clear and simple in detail, this pioneer work presents both fundamentals and more advanced theories.

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Surveying: Theory and Practice

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An excellent reference book that considers the needs of the average surveyor rather than the specialist. Covers both theory and practice in field and office work, surveying instruments, and standard surveys.

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Matrix and Tensor Calculus with Applications to Mechanics, Elasticity, and Aeronautics

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Other tests show the new alloy to have double the corrosion resistance, and thus an indicated life of twice that of mild steel piling. Piling made of the new alloy has been approved by Highway Departments and U. S. Engineers.

For further information address American Engineer, reference No. 613.

INDUSTRIAL METAL PACKINGS

An illustrated folder, describing various types of Metal Packings has been just issued. This folder, entitled "Industrial Packing" describes the metal packings most frequently used. The desirability of packings made to fit standard stuffing boxes is obvious when their advantages are understood as described in this folder.

For further information address American Engineer, reference No. 614.

STAINLESS-CLAD STEELS

This 16-page, 2-color bulletin describes a new line of clad steel Stainless-Clad Steels, and gives applications for the most important types of stainless cladding. The company has been manufacturing clad steels for over 17 years commencing with Nickel-Clad Steel, in 1930, followed by Inconel-Clad, Monel-Clad and now Stainless-Clad. Important steps in the method of producing stainless-clad steel are illustrated to show how uniformity of cladding thickness is maintained and a permanent bond insured. Several pages of corrosion data, size and weight tables, and photographs complete this interesting bulletin.

For further information address American Engineer, reference No. 615.

ETCHED STEM THERMOMETERS AND HYDROMETERS

The release of a new 20-page, 2-color catalog, covering an extensive line of Etched Stem Thermometers and Hydrometers is announced. Full listings of the line, illustrations and methods of manufacture are included. Copies may be obtained free by writing this publication.

For further information address American Engineer, reference No. 616.

DUST CONTROL SYSTEM

This 20-page bulletin gives full information concerning a Dynamic Precipitator in which the functions of an exhauster and dust separator are combined in a single compact unit. When mounted on its dust storage hopper and provided with a motor, the precipitator becomes a complete dust control system, ready for the necessary duct connections.

Complete information regarding many types of dust control systems are contained in the bulletin, which is profusely illustrated with photographs, mechanical drawings, etc., and contains considerable information regarding dust control systems in general.

For further information address American Engineer, reference No. 617.

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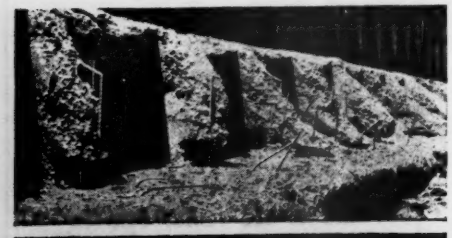

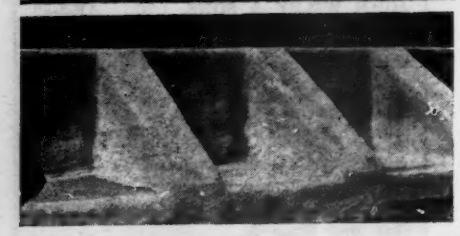

DAM SAVED WITH "GUNITE"

The upper photo shows the condition of the downstream buttresses of a dam belonging to the Central New York Power Corporation, Trenton Falls, New York, about ten years after they were built.

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The lower photo shows the "GUNITE" work after completion.

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